

THE RADICAL CURE OF INGUINAL HERNIA IN THE FEMALE.¹

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ACCORDING to the carefully prepared statistics of Macready, 8.5 per cent. of hernia are female inguinal; 5.9 per cent., female femoral, and 2.1 per cent., male femoral. Thus the number of cases of inguinal hernia in the female exceeds the total number of femoral hernia in both sexes, and forms 60 per cent. of all cases of rupture in women.

A careful study of the literature of the radical cure of hernia has convinced me that the treatment of inguinal hernia in the female has not yet received the attention it deserves. While most authorities agree that inguinal herniæ in female children are more amenable to cure by mechanical treatment than those in the male, my own experience has led me to believe that this difference is very slight. In a considerable number of female children with hernia the rupture persists after years of truss treatment. Such patients should, I believe, be subjected to operation. When the hernia develops during the period of youth or early adult life, a cure is very seldom effected by a truss, and in these cases operation should be urged at once without awaiting the result of mechanical treatment.

There is at present little unanimity among surgeons as to the best method of operating upon this variety of hernia; and since no series of cases sufficiently large to warrant conclusions of value has as yet been published, I may be excused for here presenting the results of operation in 123 personal cases.

Championnière was, I believe, the first to point out the advantages of operative treatment in inguinal hernia in the

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female. The method he advocated was to excise the round ligament along with the sac, closing the wound in the same manner as in the male.

Howard Kelly, in his recent work on "Operative Gynaecology," states that "the general principles of the operation are the same as in the operation for hernia in the linea alba, making the necessary changes to adapt the steps to the altered anatomical conditions." He further states that "if the hernial sac is small, there is no necessity of excising it, as the operation will be quite as effective without this step." In regard to the method of dealing with the round ligament, Kelly says, "If the round ligament is closely adherent to the sac, as is the case in strangulated or incarcerated hernia, I do not attempt to isolate it, but to excise it with the sac." In other cases he transplants it in the upper angle of the wound, having first cut up the internal oblique muscles, precisely as Halsted transplants the cord in the male, and closes the wound by interrupted mattress sutures of silver wire.

The opinion of Kelly that the removal of the sac is of little importance, especially in small herniæ, is, I believe, erroneous, and likely to do much harm. To show that the removal of the sac is of the greatest importance, I would cite a series of cases of hernia in children observed at the Hospital for Ruptured and Crippled during the years 1888 and 1889.

In seven cases in which the sac was not found, four relapsed in a few months, and two were not traced. I have never as yet seen a case in which the sac could not be readily found, and with a little care and patience it may always be dissected from the round ligament and tied off on a level with the general parietal peritoneum.

As to the necessity or desirability of transplanting the round ligament, I believe it is never indicated. It decidedly complicates the technique of the operation, and if, as I hope to be able to show, perfect results can be obtained without this step, the simpler operation should be preferred.

The method that I have employed in 123 cases is practically Bassini's method as performed in the male, the single

step of transplanting the cord being omitted. The incision is made one-half to three-fourths of an inch above and parallel to Poupart's ligament, and should extend nearly to the level of the anterior superior spine. The aponeurosis of the external oblique is slit up well over the internal ring and dissected back to the edge of the rectus on the inner side and on the outer sufficiently far to expose the thick fold of Poupart's ligament. If the sac is sought for high up just below the edge of the internal oblique muscle, there will be no difficulty in finding it. After the sac has been dissected from the round ligament and thoroughly freed well within the external ring, it is transfixed and tied off with catgut. The wound is then closed in three layers as in Bassini's method, a medium-sized kangaroo tendon being used for all buried sutures and catgut for the skin. In the deep layer, interrupted sutures, usually four or five in number, are introduced from above downward, bringing the internal oblique and transversalis muscle over to Poupart's ligament. The round ligament is allowed to drop back into the lower angle of the wound, and as it approaches the pubic bone it is so small that it requires much less space than the cord in the male. The aponeurosis is now sutured with a continuous suture of kangaroo tendon, about the size of a number one catgut. The skin is closed without drainage, and the wound dressed according to the practice that I have used in all hernia cases the past ten years, viz., with iodoform gauze and moist bichloride gauze 1-5000.

This method of operation and dressing has given such admirable results as regards primary union that I have been loth to change. Prior to December, 1898, when I began to use rubber gloves for assistants and cots or gloves for myself, I had 96 per cent. of primary wound healing; and since this date I have had 150 cases of hernia,¹ with but one suppuration, which was proved bacteriologically to have been due to imperfect sterilization of the skin of the operative field rather than to defective technique.

¹ Including cases up to October 1, 1900, this number has been increased to 200 cases, with only one case of suppuration.

As bearing on the necessity of wearing rubber gloves during operation, I would cite the bacteriological findings in thirty-five examinations. Scrapings beneath the nails of the surgeons: In eighteen cases no growths were found; in seventeen various forms of bacteria were present; in seven cases diplococci; in two cases streptococci. In the majority of instances the chloride of lime method was used for the sterilization of the hands.

Sterilizations of the skin of the field of operation were successful in the large majority of cases.

Of sixty-eight cases in which portions of the skin were removed from the field of operation just before the primary incision was made, fifty-three were found to be sterile; while in fifteen only were there bacterial growths. Of these streptococci were found once; diplococci, five times. The presence of these organism had little, if any, influence upon the wound healing, with the exception of one case in which streptococci were found. In this case, although gloves were worn by the surgeon and the assistants, the operation was perfectly simple and rapidly performed. A sudden rise of temperature occurred twenty-four hours after the operation, and continued high until the dressing was removed. At the end of forty-eight hours extensive suppuration was found, extending down to the deep fascia, and a culture made from the base showed a pure culture of streptococcus, proving that in this instance infection was due to the imperfect sterilization of the skin.

Before giving the results of operation, I will briefly discuss the question of the best suture material for hernia operations. With all that has been written on the subject, the question is far from settled. That good results may be obtained by almost any form of suture cannot be questioned; but it being our aim to obtain not merely good results, but the best possible results, it behooves us to study most carefully the question of suture material. For the sake of brevity, I will make mention of but two classes of sutures,—non-absorbable and absorbable.

While catgut was originally employed by Steele, Czerny,

and many others, in the earlier cases of operation for hernia, after the introduction of antiseptic surgery, the difficulty of perfectly sterilizing catgut soon led most of the continental and many of the American surgeons to abandon it, and to adopt some form of non-absorbable suture, viz., silk, silver wire, and silkworm gut, all of which could be rendered perfectly sterile by boiling. While methods of preparing absorbable sutures have greatly improved, so that such sutures can easily be rendered absolutely and invariably sterile, the old prejudice against them still exists in the minds of many leading surgeons to-day; and at the recent meeting of the American Surgical Association a well-known surgeon stated that he never used catgut because he believed it was impossible to sterilize it. That this is a mistaken opinion can be amply proven both by clinical and bacteriological results. At the Hospital for Ruptured and Crippled during the past ten years both catgut and kangaroo tendon have been used by Dr. Bull and myself, and frequent bacteriological tests have always shown the suture material sterile.

The clinical results as regards primary union, not having been equalled by the results obtained in cases in which non-absorbable sutures were used, fully confirm this view. The disadvantages of buried non-absorbable sutures have been pointed out repeatedly, and the only reason why many surgeons still cling to them is, I think, the mistaken belief that absorbable sutures cannot be entirely relied upon. This opinion will linger so long as surgeons of prominence continue to attribute all their failures to secure primary union to the buried absorbable suture. I have listened to arguments offered in all seriousness by good surgeons in support of the contention that the catgut or the kangaroo tendon suture were responsible for their cases of suppuration. In a recent number of a well-known medical journal there is reported a case with the following headline in large type: "Suppuration after Hernia from a Deep Suture of Van Horn's Kangaroo Tendon." The hernia recurred; the surgeon again operated, this time using silver wire. He stated that he had reported this case "to

illustrate the uncertainty in herniotomy, as well as in other operations, of Van Horn's kangaroo tendon." Nothing is said as to whether rubber gloves were worn at the operation, nor whether the skin of the field of operation had been examined bacteriologically and pronounced sterile. In the absence of such data, it seems strange that the kangaroo tendon should alone be held responsible for the failure. As presumptive evidence that it was not responsible, I will say that Van Horn's tendon and catgut sutures have been used by Dr. Bull and myself for nearly ten years, and frequent bacteriological tests have always shown them sterile.

Silver wire, which was introduced in hernia operations by Mitchell Banks, of Liverpool, in 1882, has recently been very strongly advocated by Halsted and Bloodgood at the Johns Hopkins Hospital. Yet, one need look no further than Bloodgood's own report to find ample evidence that non-absorbable sutures should be discarded in all operations for the radical cure of hernia. In 320 cases, suppuration occurred in forty-six cases, or 14.37 per cent. Four patients returned at periods from one week to four months after leaving the hospital with sinus formations or stitch abscesses. In one case there occurred three stitch abscesses and suppuration during eight months after operation. Bloodgood notes the more or less steady improvement in results as regards primary wound healing. Thus, with silk sutures, in 1889 and 1890, 36.36 per cent. suppurated; in 1890 and 1891, 26 per cent. suppurated. Curiously enough, in 1892 and 1893, in seventeen cases no suppuration occurred; while in 1894 and 1895 in nine cases 55 per cent. suppurated. Silver wire was substituted for silk in 1894, and of thirty-seven cases, four, or 10.8 per cent., suppurated; while during the years 1898 and 1899, of eighty-seven cases, only four, or 6.6 per cent., suppurated. Bloodgood states that of 116 cases in which silk was used for the buried sutures, suppuration occurred in 24 per cent.; while in 330 cases in which silver wire was used, suppuration occurred in but 4.2 per cent. This at first sight would appear indubitable proof of the superiority of silver wire over silk, yet, on closer

study, it will be seen that it proves nothing. It will be found that the striking improvement in results following the use of silver wire is practically synclronous with the introduction of rubber gloves as a routine measure, whereas the gloves were not used in the cases in which silk was employed. This fact, combined with increased familiarity with the technique of the operation and consequently smaller amount of laceration of the parts, would entirely account for this difference in primary wound healing without attributing it to any inherent advantages of silver wire over silk sutures.

With the more general use of rubber gloves and other improvements in technique, we may, I think, assume that the cases of radical cure of hernia which fail of primary wound healing will grow steadily fewer and fewer in number, no matter what form of suture is used. Yet the fact cannot be emphasized too strongly that it is NOT ALONE in cases which suppurate that sinuses develop; but they may occur in cases which heal by perfect primary union, and they may occur months' and years after operation. I have observed one such case in which a sinus occurred six months, another two years and a half, and a third three years and eight months after operation, silkworm-gut sutures being extracted each time. Bloodgood states that, of twenty-two cases of more extensive suppuration of the wounds closed with silk, only three cases healed without the discharge of some of the deep sutures; while of thirteen similar cases in which silver wire was used, nine cases healed in two to five weeks, and in four cases only was sinus formation observed. This does not necessarily mean that no others occurred, inasmuch, as out of the thirty cases of late sinus formation observed at the Hospital for Ruptured and Crippled, scarcely a single patient had returned to the hospital at which the operation had been performed.

What advantages do the non-absorbable sutures then possess to offset these serious disadvantages, consisting not merely in slow healing and troublesome sinuses, but a greatly increased liability to recurrence of the hernia?

It was Halsted himself, writing in 1893, who said, "The

use of powerful sewing materials in surgery is, it seems to me, based on a misapprehension of pathology. If, for example, the tension is so great that wire must be used to bring the parts together, one must not expect permanent assistance from the wire, for the stitches will eventually cut through to the extent necessary to relieve the tension." With this earlier opinion we most thoroughly agree.

Having shown that chromicized catgut or tendon may be rendered perfectly sterile, and that they may remain unabsorbed sufficiently long to fulfil all the requirements of a buried suture, without the danger of causing sinus formation, it remains for those who still use silk, silver wire, or silkworm gut to give some new and better reasons why they should not be abandoned.

To return to the technique of the operation itself, I have always believed the cutting of the internal oblique muscle not only unnecessary, but likely to weaken the canal.

In support of this view I would cite the results of two recent investigators in the anatomy of inguinal hernia, Turk, of Chicago, and Blake, of New York.

Turk made careful dissections of the inguinal canal in fifty cadavers, of which twenty-seven were males, nine adult females, and the remainder children or specimens of foetal life. Turk's results prove that the internal ring derives its greatest protection from the internal oblique muscle. The average length of the origin of the internal oblique in the female was 9.3 centimetres, that is, the muscle arises on an average from the outer four-fifths of the ligament, while in the male it arises from the outer two-thirds. This greater length of the muscular origin would account in some measure for the relative infrequency of inguinal hernia in the female. Turk concludes that "the basis of the operation for the radical cure of oblique inguinal hernia should be to restore the internal ring to its normal size and position; second, to suture the internal oblique and transversalis muscles to Poupart's ligament." Turk does not believe in transplanting the cord.

Blake, of New York, in a paper recently read before the

Surgical Section of the Academy, reported the results of a series of careful dissections of the inguinal canal made upon twenty-five well-developed muscular subjects. He found that in no case did the insertion of the lower fibres of internal oblique and transversalis extend for more than five-eighths of an inch laterally to the insertion of the rectus; in the majority the extent was less than one-half an inch, and in some the insertion laterally to the rectus was inappreciable, and this insertion was almost wholly formed from the internal oblique. He states that our main reliance in the cure of inguinal hernia is the internal oblique muscle, and our effort should be to restore the normal parallelism of its fibres to Poupart's ligament.

In regard to Halsted's method of cutting the internal oblique, Blake says the most serious objection to this division is that the nerve supply of these fibres is divided laterally, hence the mesial portion of many of the divided fibres are deprived of that supply, and must consequently suffer. Blake calls attention to a second objection which has been overlooked by most writers, that is, that the divided ends of the muscle of the internal oblique are not re-united in their normal relation, but the proximal ends of the distal fibres are slid downward and inward to be sutured to Poupart's ligament. Blake says that it is the change of normal direction which prevents the muscle fibres from working so advantageously as if their parallelism with Poupart's ligament had been maintained.

In regard to results of operation in inguinal hernia in the female, as I have already said, few statistics are available. Bloodgood's report (*loc. cit.*) of operations of 459 cases of hernia at the Johns Hopkins Hospital contains a list of thirty-nine cases, with detailed results. The round ligament was excised in twenty cases, and the internal oblique muscle divided and transplanted (drawn down to the line of the wound). In six cases the ligament was excised, but the muscle not divided. In three cases the round ligament was not disturbed, but the internal oblique muscle was divided and transplanted. In five cases the round ligament was left undisturbed, and there was no division of the internal oblique muscle. In two cases the

round ligament was transplanted at the upper angle of the divided internal oblique muscle in the same manner as the cord is transplanted in the male (Halsted's operation).

In regard to results, death occurred in one case, recurrence in one case. Perfect results were noted in twenty-one cases. Six cases have remained well for three to eight years; three cases, two years, and nine cases one year.

My personal results are as follows:

From 1892 to the present date, I have operated upon 123 cases of inguinal hernia in the female without mortality.¹

The ages of the patients have ranged between four and seventy years. Seventy-three patients were under fourteen years of age, and fifty cases between fourteen and seventy years. In eight cases, or 6.5 per cent., suppuration occurred; though in every case it was slight and limited to stitch-hole infection, not prolonging the stay in the hospital.

The average time I have kept patients in bed has been ten days, and they have been allowed to go home at the end of two weeks. A spica bandage is kept on for two weeks longer, at the end of which time support of any kind is discontinued.

I have been able to trace all but thirteen patients.

1 was well 7 years after operation; 2 were well 5 to 6 years after operation; 5 were well 4 to 5 years after operation; 14 were well 3 to 4 years after operation; 26 were well 2 to 3 years after operation; 27 were well 1 to 2 years after operation; 16 were well 6 months to 1 year after operation.

Two died one and two years after operation without recurrence. Thirteen were not traced, and the remainder are too recent to be considered. Not a single relapse has been observed. Comparing these results with the results of operations for inguinal hernia in the male, we see that the prognosis is even better in the female, and that the prospect of a cure may be reasonably assured.

[My own results show six relapses in 545 cases of inguinal hernia in the male operated upon by Bassini's method.]

¹ Including the cases up to October 1, 1900, this number has been increased to 134.